

WHAT IS CLAIMED IS:

1. An AM demodulator that receives and demodulates an AM modulated input signal using a wave-detection signal generated by a phase lock loop, said AM demodulator comprising:
- a detection unit which detects whether the detection signal when it detects that a signal obtained by AM wave-detection of the wave-detection signal has a predetermined relationship with respect to a predetermined amplitude level;
 - a first multiplying unit which raises the input signal to $2n$ -th power, where n is an integer equal to or greater than 1;
 - a voltage control oscillator which output the wave-detection signal;
 - a second multiplying unit which raises the wave-detection signal output from said voltage control oscillator to $2n$ -th power;
 - a phase control unit performs phase control using the outputs of said first and second multiplying units; and
 - a switching unit which resets said phase lock loop comprising said detection unit, first and second multiplying units, and said phase control unit according to the detection signal.

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2. The AM demodulator according to claim 1, further comprising:

a first phase shift unit which generates, based on the input signal, two signals that have a phase difference of 90 degrees; and

a second phase shift unit which generates, based on the wave-detection signal output from said voltage control oscillator, two signals that have a phase difference of 90 degrees,

wherein said first multiplying unit processes the two signals generated by said first phase shift unit, and said second multiplying unit processes the two signals generated by said second phase shift unit.

3. An AM demodulator that receives and demodulates an AM modulated input signal using a wave-detection signal generated by a phase lock loop, said AM demodulator comprising:

a detection unit which detects whether the detection signal when it detects that a signal obtained by AM wave-detection of the wave-detection signal has a predetermined relationship with respect to a predetermined amplitude level;

a first multiplying unit which raises the input signal to $2n$ -th power, where n is an integer equal to or greater

than 1;

a voltage control oscillator which output the wave-detection signal;

a second multiplying unit which raises the
5 wave-detection signal output from said voltage control oscillator to $2n$ -th power;

a first phase control unit performs phase control using the outputs of said first and second multiplying units;

a second phase control unit performs phase control
10 using the wave-detection signal output from said voltage control oscillator;

a filter unit which generates a signal for controlling said voltage control oscillator; and

a selection unit which selects a signal output from
15 either said first phase control unit or said second phase control unit according to the detection signal and provided the selected signal to said filter unit.

4. The AM demodulator according to claim 3, further
20 comprising:

a first phase shift unit which generates, based on the input signal, two signals that have a phase difference of 90 degrees; and

a second phase shift unit which generates, based on
25 the wave-detection signal output from said voltage control

oscillator, two signals that have a phase difference of 90 degrees,

wherein said first multiplying unit processes the two signals generated by said first phase shift unit, and said
5 second multiplying unit processes the two signals generated by said second phase shift unit.

5. An AM demodulator that receives and demodulates an AM modulated input signal using a wave-detection signal
10 generated by a phase lock loop, said AM demodulator comprising:

a detection unit which detects whether the detection signal when it detects that a signal obtained by AM wave-detection of the wave-detection signal has a
15 predetermined relationship with respect to a predetermined amplitude level;

a first multiplying unit which raises the input signal to $2n$ -th power, where n is an integer equal to or greater than 1;

20 a voltage control oscillator which output the wave-detection signal;

a second multiplying unit which raises the wave-detection signal output from said voltage control oscillator to $2n$ -th power;

25 a first phase control unit performs phase control using

the outputs of said first and second multiplying units;

a second phase control unit performs phase control using the wave-detection signal output from said voltage control oscillator;

5 a filter unit which generates a signal for controlling said voltage control oscillator; and

a switching unit which provided a signal output by said second phase control unit to said filter unit according to the detection signal.

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6. The AM demodulator according to claim 5, further comprising:

a first phase shift unit which generates, based on the input signal, two signals that have a phase difference

15 of 90 degrees; and

a second phase shift unit which generates, based on the wave-detection signal output from said voltage control oscillator, two signals that have a phase difference of 90 degrees,

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wherein said first multiplying unit processes the two signals generated by said first phase shift unit, and said second multiplying unit processes the two signals generated by said second phase shift unit.